A combined parking and carpooling policy: the case of the University of Luxembourg

Sprumont Francois, Ouzdi Youssef and Viti Francesco

Background

Despite its small size, Luxembourg is facing important mobility challenges. Out of the 380 000 available jobs in the country, nearly 43% of them are occupied by cross-borders workers (STATEC, 2015). These 165 000 cross borders traveling every day from France, Belgium and Germany generate an important pressure on the transport infrastructures. Because 89% of the cross-borders workers and 74% of the resident workers commute by car, the road system, at peak hours, reaches saturation.

The University of Luxembourg (UL) is more and more committed to reduce the carbon footprint related to the staff and students commuting behaviour. Travel surveys run in 2012 and 2014 have shown a relatively virtuous behaviour of the UL staff if compared to the rest of the country, with about 40% of the respondents declaring to use other modes than cars.

However, in order to decrease the pressure (in term of commuting flow, residential prices, etc.) on Luxembourg-City and to reach a more balanced polycentric development across the country the development of a new activity pole, the *Citè des Sciences* located in the area of Belval (Esch-surAlzette), has been planned by the government to be fully operational by 2020. The University of Luxembourg (UL) will be one of the institutions relocating most of its infrastructure in this new town.

Without any doubts, this workplace relocation will greatly affect the University staff commuting mobility. Despite the evident benefits of bringing a polycentric approach to the country, the UL staff and students will have to adapt their daily and weekly mobility to the new location. This location will not offer the same accessibility in terms of transportation services, and the possibility for most of the travellers to avoid entering the congested area around Luxembourg City will be a clear incentive for shifting to the car mode. Predictions based on behavioural models have indicated that the shift will be significant if no transport policy solutions will be adopted (Sprumont et al, 2014).

At the National level, the MoDu document (national sustainable mobility strategy, 2012) defines strong modal split objectives and the number of parking spaces available for the university on Belval site will rely on this national objective. This will certainly be a powerful instrument to regulate the modal shift, but will have to be carefully complemented with positive incentives in order to drive travellers to sustainable behaviour and not increasing their disutility for travelling to work. Hence, different policy solutions and incentives for collective transport use are being conceived, in order to provide flexible alternatives to the car. However, discounts proposed to the transit passes are often seen as extra rewards for public transport users and hardly have the desired effect of shifting car users to change to public transport. A combination of well-chosen carrot and stick measures are needed to obtain sustainable results.

Data and preliminary observations

The University human resource department provided a file containing the postal code of the residence place of all the university staff members (1st October 2014). The data permits to define the working

place of each employee. The PhD student population is also included in this data set. Among about 1500 workers, 70% live in Luxembourg, 10% in France, 15% in Germany and 5% in Belgium.

Because of the university facility relocation 22km south-west of the country, the people living in Luxembourg city as well as the German commuters will suffer significantly from this relocation while, at the opposite, French and Belgian commuters will benefit of relatively shorter commuting trips. Even if the university relocation is not exactly similar as the major job decentralization process in the US described by Cervero & Wu (1998), still, a major workplace sub-urbanization increase on average the commuting distance. Moreover, the public transport offers will differ significantly as currently the system is centred around Luxembourg City.

From the data set, it can be observed that an important number of University staff members are located in few communes. Five communes, including 2 non-Luxembourgish communes, hosts 52% of the University staff population. This highlights the important potential of carpooling among the members of the institution. Preliminary analysis has shown that it is possible to cluster a significant number of commuters by simply looking at the spatial distance between places of origin, and accounting for the alternative routes to the destination (Ouzdi, 2014). These analyses did not take into account however that carpooling may in some case favour the shift from public transport instead of dis-incentivising single-occupancy use of the cars.

Our aim is to incentivize this travel alternative especially in cases where the public transport system is not providing already a competitive service, as the final objective is to still meet the modal split objectives set by MoDu. We then need to bring carpooling within a multimodal environment, and to develop a policy that suggests shifts from single-occupancy cars and not from alternative collective transport modes.

By creating an optimization system integrating the parking management scheme, the transit pass subsidy and soft mode incentives, it will be possible to lead people adopting a more sustainable commuting behaviour while, in the time, save university budget. Hence, in this paper we develop a methodology based on credit schemes or mobility budget concepts, which are recently becoming popular in policy and network design research. These concepts have shown to be very effective to design pricing schemes and in a multimodal environment (e.g., Yang and Wang, 2011; Wu et al., 2012) but to the best of our knowledge they have not been adopted for combining parking management and carpooling strategies.

Methodology

The first methodological step in this research is the development of accessibility maps and indicators for car and public transport modes. So far, few scientific contributions analysed the accessibility variation for car and Public Transport (PT) on important workers population considering relocation actions of this size. Later, these maps will permit to construct modes accessibility indicators that will be used as an input for the identification of the “Best Possible Behaviour Strategy” (BPBS). This will define the ideal minimum mobility budget that a traveller can use. This budget will therefore differ depending on the accessibility of his/her place of origin.

The second scientific contribution is the development of an integrative sustainable mobility strategy combining a Parking Management Scheme (PMS), a transit pass subsidy policy and carpooling.

Outputs of the accessibility analysis are used to obtain for each worker a series of indicators that will be used to develop the global mobility indicator, the *mobility budget*. Our aim is to develop a mobility credit scheme system where users could use points to park their car or use the public transport system with additional discounts. These could be obtained by shifting from single-use car modes to any other option, e.g. soft modes, carpool, public transport. The gain in terms of credits will then differ depending on the accessibility by car and PT, and the potential presence of car-poolers both in the area and along the route to the destination. In the latter case, credits are set as proportional to the distance travelled in carpool mode.

The main methodological challenge in this work resides in the development of a single credit scheme combining the car parking policy (price and access), the existing transit pass subsidy policy and that considers explicitly carpooling as mode option. The advantage is however to reach a unique policy that will push single-occupancy vehicles (SOV) to shift to public transport and to carpooling if public transport accessibility is not competitive with respect to car accessibility.

This approach might help other major private or public institutions to define optimum subsidy strategies regarding their parking and staff's public seasonal ticket costs.

References

Cervero, R., Wu, K.-L., 1998. Sub-centring and Commuting: Evidence from the San Francisco Bay Area, 1980-90. Urban Stud 35, 1059–1076

Fujii, S., Kitamura, R., 2003. What does a one-month free bus ticket do to habitual drivers? An experimental analysis of habit and attitude change. Transportation 30, 81–95.

Institut National de la Statistique et des études économiques du Grand-Duche de Luxembourg (STATEC) (2015)

Le portail des statistiques. Available at http://www.statistiques.public.lu (accessed 2 January 2014)

MODU (Stratégie globale pour une mobilité durable), 2012, Ministère du Développement Durable et des Infrastructures, Luxembourg.

Ouzdi, Y. (2014) Etude de l'impact de la mobilité présente et future au travers d'un échantillon d'individus travaillant et vivant à Luxembourg – Ville, Summer Project – University of Luxembourg

Sprumont, F., Viti, F., Caruso, G., & König, A. (2014). Workplace Relocation and Mobility Changes in a Transnational Metropolitan Area: The Case of the University of Luxembourg. Transportation Research Procedia, 4, 286-299.

Yang H., Wang X. (2011). Managing network mobility with tradable credits. Tansportation Research Part B 45(3), pp. 580-594.

Wu D., Yin Y., Lawphongpanich S., Yang, H. (2012). Design of more equitable congestion pricing and tradable credit schemes for multimodal transportation networks. Transportation Research Part B 46(9), pp. 1273-1287